

## CLAIMS

1. A path search method for detecting  
respective timings of path components included a  
5 signal received via a multipath propagation path,  
said method comprising the steps of:

a first path search step for detecting respective timings of path components using pilot symbols of a known phase included in said signal received via the multipath propagation path; and

a second path search step for detecting respective timings of path components using information symbols derived from a signal demodulated according to said timings detected in the first path search step and said pilot symbols of a known phase.

20 2. The path search method as claimed in claim 1, wherein said information symbols derived from the signal demodulated according to the timings detected in the first path search step are generated by implementing the steps of:

despreading said signal received via the  
multipath propagation path according to said timings  
25 detected in the first path search step;

          cophasing and summing the information  
symbols despreaded according to said respective path  
timings in a symbol by symbol manner;

demodulating and implementing data  
30 decision of said cophased and summed respective  
information symbols; and  
remodulating said data decision signal.

35 3. The path search method as claimed in claim 2, wherein said information symbols derived from the signal demodulated according to the timings detected in the first path search step are selected

4. The path search method as claimed in claim 1, wherein said second path search step is repeated until a predetermined condition is satisfied.

15                   6. A channel estimation method for  
estimating channel variation using pilot symbols,  
said method comprising:  
                  a pilot symbol acquiring step for  
acquiring pilot symbols of a known phase included in  
20 received packets; and  
                  a channel estimation step for implementing  
channel estimation using said acquired pilot symbols.

8. The channel estimation method as claimed in claim 6, wherein said pilot symbols of a known phase are code-multiplexed with the packets.

35 9. The channel estimation method as claimed in claim 1, wherein said channel estimation step implements channel estimation by combining said pilot symbols of a known phase and pilot symbols included in other packets transmitted from the same transmission source.

5           a pilot symbol acquiring step for  
acquiring pilot symbols of a known phase included in  
a common control channel in a multiplexed manner;  
and

a channel estimation step for implementing  
0 channel estimation using said acquired pilot symbols

11. The channel estimation method as  
claimed in claim 10, wherein said pilot symbols of a  
known phase are time-multiplexed with the common  
control channel.

12. The channel estimation method as claimed in claim 10, wherein said pilot symbols of a known phase are code-multiplexed with the common control channel.

13. The channel estimation method as claimed in claim 10, wherein said channel estimation step implements channel estimation by combining said pilot symbols of a known phase and pilot symbols included in other packets transmitted from the same transmission source.

14. A channel estimation method for  
estimating channel variation using pilot symbols,  
said method comprising:

a first pilot symbol acquiring step for acquiring pilot symbols of a known phase included in packets and in a common control channel in a multiplexed manner;

a second pilot symbol acquiring step for acquiring pilot symbols of a known phase included in

said common control channel; and  
a channel estimation step for implementing  
channel estimation using said acquired pilot symbols.

5           15. A channel estimation method for  
estimating channel variation using pilot symbols,  
said method comprising:  
a pilot symbol acquiring step for  
acquiring pilot symbols of a known phase included in  
10 a received packet;  
a tentative channel estimation step for  
implementing tentative channel estimation using said  
acquired pilot symbols;  
a tentative data decision information  
15 symbol generating step for compensating for the  
channel variation in accordance with a result of  
said tentative channel estimation and generating  
tentative data decision information symbols from the  
compensated information symbols; and  
20 a channel estimation step for generating  
information symbols wherefrom modulation components  
are removed using said tentative data decision  
information symbols and implementing channel  
estimation using said pilot symbols and information  
25 symbols.

16. The channel estimation method as  
claimed in claim 15, wherein said tentative data  
decision information symbol generating step includes  
30 a weighting process for weighting said tentative  
data decision information symbols according to the  
reliability.

17. The channel estimation method as  
35 claimed in claim 15, wherein said tentative data  
decision information symbol generating step includes  
an error correction process for error correction

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wherein said pilot symbol acquiring part includes:

a subcarrier acquiring part for acquiring a plurality of subcarriers included in said reception signal; and

a pilot symbol acquiring step for acquiring a plurality of pilot symbols of a known phase included in said plurality of subcarriers, respectively, and,

wherein said channel estimation part implements channel estimation for each of said subcarriers using said plurality of pilot symbols.

25. A communication device for implementing path search for detecting respective timings of path components included a signal received via a multipath propagation path, said device comprising:

a first path search part for detecting respective timings of path components using pilot symbols of a known phase included in said signal received via the multipath propagation path; and

a second path search part for detecting respective timings of path components using an information symbols derived from a signal demodulated according to said timings detected in the first path search step and said pilot symbols of a known phase.

26. A communication device for implementing channel estimation for estimating channel variation using pilot symbols, said device comprising:

a pilot symbol acquiring part for acquiring pilot symbols of a known phase included in received packets; and

a channel estimation part for implementing

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5 a tentative data decision information  
symbol generating part for compensating for the  
channel variation in accordance with a result of  
said tentative channel estimation and generating a  
tentative data decision information symbols from the  
compensated information symbols; and

10 a channel estimation part for generating  
information symbols wherefrom modulation components  
are removed using said tentative data decision  
information symbols and implementing channel  
estimation using said pilot symbols and information  
symbols.

15 30. A communication device for  
implementing channel estimation for estimating  
channel variation using pilot symbols, said device  
comprising:

20 a subcarrier acquiring part for acquiring  
a plurality of subcarriers included in received  
packets;

a pilot symbol acquiring part for  
acquiring a plurality of pilot symbols of known  
phases included in said plurality of subcarriers,  
respectively; and

25 a channel estimation part for implementing  
channel estimation for each of said subcarriers  
using said plurality of pilot symbols.

30 31. A communication device comprising:  
path search means for performing a first  
path search step in which respective timings of path  
components are detected using pilot symbols of a  
known phase included in a reception signal received  
via a multipath propagation path; and

35 channel estimation means for performing a  
first channel estimation step in which channel  
estimation is implemented for estimating channel

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variation after said first path search step,

wherein said path search means implements  
a second path search step in which respective  
timings of path components are detected using  
5 information symbols derived from a signal  
demodulated after said first channel estimation step  
according to said timings detected in the first path  
search step and said pilot symbols of a known phase,  
and

10 wherein said channel estimation means  
implements a second channel estimation step in which  
channel estimation is implemented for estimating  
channel variation using information symbols derived  
from a signal demodulated after said first channel  
15 estimation step according to said timings detected  
in the second path search step and said pilot  
symbols of a known phase, and thereafter,  
recursively implementing path search and channel  
estimation by repeating the processes of  
20 implementing said second path search step using said  
information symbols demodulated after said second  
channel estimation step and pilot symbols and  
implementing said second channel estimation step  
using information symbols fed back in accordance  
25 with the timing detected in said second path search  
step and pilot symbols.

32. The communication device as claimed in  
claim 31, wherein said pilot symbols are included in  
30 at least one of packets and a common control channel  
of said received signal.

33. The communication device as claimed in  
claim 32, wherein said pilot symbols are multiplexed  
35 with at least one of said packets and said common  
control channel.

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